Claims

1. A signal synthesizer, comprising:

a dual-oscillator synthesizer having a first oscillator in a main loop generating an output signal, having a second oscillator in an offset loop providing an offset signal to the main loop and to a feedback path of the offset loop, and having a harmonic mixer receiving a first signal at a first input; and

an offset stage in the feedback path of the offset loop, receiving the offset signal, shifting the frequency of the offset signal to a lower frequency and providing the frequency-shifted offset signal to a second input of the harmonic mixer, the harmonic mixer mixing a harmonic multiple of the first signal with the frequency-shifted offset signal to provide a mixing product that is phase locked to a reference oscillator.

2. The signal synthesizer of claim 1 wherein shifting the frequency of the offset signal includes mixing the offset signal with a second signal in the offset stage, the second signal having a higher frequency than the first signal.

3. The signal synthesizer of claim 1 wherein the offset signal is mixed with the output signal in the main loop.

4. The signal synthesizer of claim 1 wherein the offset signal has a frequency equal to the frequency of the second signal, plus the frequency of the first signal times the harmonic multiple, plus the frequency of the reference oscillator.

5. The signal synthesizer of claim 4 wherein the output signal has a frequency equal to the frequency of the offset signal, shifted by the frequency of a frequency tunable interpolation signal.

6. The signal synthesizer of claim 1 wherein the main loop generating the output signal provides the first local oscillator of a spectrum analyzer.

7. The signal synthesizer of claim 1 wherein the main loop generating the output signal provides the first local oscillator of a spectrum analyzer and wherein the second signal is provided by a second local oscillator of the spectrum analyzer.

8. The signal synthesizer of claim 2 wherein the main loop generating the output signal provides the first local oscillator of a spectrum analyzer and wherein the second signal is provided by a second local oscillator of the spectrum analyzer.

9. The signal synthesizer of claim 3 wherein the main loop generating the output signal provides the first local oscillator of a spectrum analyzer and wherein the second signal is provided by a second local oscillator of the spectrum analyzer.

10. The signal synthesizer of claim 4 wherein the main loop generating the output signal provides the first local oscillator of a spectrum analyzer and wherein the second signal is provided by a second local oscillator of the spectrum analyzer.

11. The signal synthesizer of claim 5 wherein the main loop generating the output signal provides the first local oscillator of a spectrum analyzer and wherein the second signal is provided by a second local oscillator of the spectrum analyzer.

12. A signal synthesis method, comprising:

a) generating an output signal in a main loop of a dual-oscillator synthesizer;

b) generating an offset signal in an offset loop of the dual-oscillator synthesizer;

c) providing the offset signal to the main loop and to a feedback path of the offset loop;

d) shifting the frequency of the offset signal to a lower frequency; and

e) mixing a harmonic multiple of an applied low frequency reference signal with the frequency-shifted offset signal in the offset loop.

13. The signal synthesis method of claim 12 wherein (d) includes mixing the offset signal with a second signal having a frequency that is greater than the frequency of the first signal.

14. The signal synthesis method of claim 13 further comprising phase locking to a reference oscillator, a mixing product resulting from (e).

15. The signal synthesis method of claim 13 wherein the offset signal has a frequency equal to the frequency of the second signal, plus the frequency of the first signal times the harmonic multiple, plus the frequency of the reference oscillator.

16. The signal synthesis method of claim 13 further including mixing the offset signal with the output signal in the main loop.

17. The signal synthesis method of claim 15 wherein the main loop generating the output signal has a frequency equal to the frequency of the offset signal, shifted by the frequency of a frequency tunable interpolation signal.

18. The signal synthesis method of claim 14 wherein the main loop generating the output signal provides the first local oscillator of a spectrum analyzer and wherein the second signal is provided by a second local oscillator of the spectrum analyzer.

19. The signal synthesis method of claim 15 wherein the main loop generating the output signal provides the first local oscillator of a spectrum analyzer and wherein the second signal is provided by a second local oscillator of the spectrum analyzer.

20. The signal synthesis method of claim 16 wherein the main loop generating the output signal provides the first local oscillator of a spectrum analyzer and wherein the second signal is provided by a second local oscillator of the spectrum analyzer.